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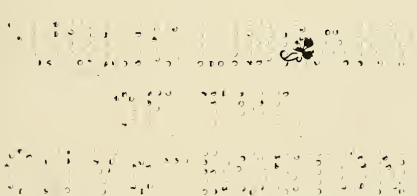
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THE PRACTICAL APPLICATION OF THE
ART OF ASEPSIS TO THE PREPARATION
OF SURGICAL DRESSINGS ❁❁❁❁❁❁



JOHNSON & JOHNSON
ASEPTIC LABORATORIES
NEW BRUNSWICK, NEW JERSEY

1897

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INTRODUCTION



THE following pages give in brief the methods by which surgical dressings are prepared in our laboratories. These methods afford striking evidence of the advancement of the surgical art as well as illustrate the great progress that has been made in the technical production of dressing materials suited to the requirements of surgical practice.

The processes here outlined are the practical application of scientific knowledge, the outcome of the modifications and amplifications of procedures that have been brought about in the evolution of surgery.

Ten years ago, entering the field as pioneer manufacturers of antiseptic dressing materials we stated that "the importance of reliable dressings cannot be overestimated; without these all the skill of the surgeon is wasted." Time has emphasized the imperative necessity and supreme importance of perfect surgical dressings.

From the beginning of our experience to the present time, we have held in view one single purpose—the preparation of dressing materials that shall meet the requirements of and embrace the advances made in the art of surgery. In attaining this result, we believe that we have been factors in making the practical application of the principles both of antisepsis and asepsis universal and possible. The pages which follow are a further contribution to this end. While not presuming so much as to suggest to the physician or surgeon as to the kind or make of material he should use in wound dressing, we believe that disappointment and serious results will follow unless he demands and uses dressings prepared in a manner equal to the methods here outlined or according to the art of asepsis."

We desire to here express our appreciation of the aid given us by many able surgeons, who have assisted in the perfection of our processes by personal inspection and helpful suggestions, as well as for the confidence and recognition so generously accorded our products by the profession in general and also for the support of many pharmacists who have given them their preference.

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The Advance of Asepsis.



“**M**EDICINE and surgery have made more progress in the last twenty years than in the twenty centuries preceding.” The surgical dressing has kept pace with this progress. In the beginning of the present era of surgery the teachings of Lister demanded that dressings to be applied to a wound should be saturated with chemicals capable of killing germs. Antiseptics were then empirically applied. The masses of pitch, paraffin, fat and carbolic acid which made up a typical dressing were directly opposite to those in use at the present time.

In the decades which have followed this epoch, the principles of antiseptics have made continuous progress. The accurate observations of bacteriology have brought a clearer knowledge of micro-organisms and their influence in the causation of wound infection. This knowledge has determined the value of antiseptics, and has given to the surgeon newer and better weapons than those first used in the combat against wound infection.

Chemical sterilization and mechanical cleanliness are among the newer weapons that have been called to the aid of the surgeon. The antiseptic dressing has been made surgically clean. Antisepsis has not been abandoned, but has developed into its higher form—asepsis. Thus the antiseptic dressing has become aseptic.

The present requirements for a surgical dressing are defined by a competent authority as—

1. Absorb well wound secretions.
2. Be free from pathogenic organisms.
3. Work antiseptically, *i. e.*, prevent decomposition of the absorbed secretions.

Materials possessing the power to absorb and disinfect wound secretions are easily secured ; but the fundamental requirement, that all material which shall come in contact with the wound shall be free from pathogenic organisms, is not so easy of fulfilment.

Pathogenic organisms are widely distributed and are universally present under the conditions which surround the preparation of dressings. They are easily transferred to and held by the materials which enter into the composition of dressings.

Further, there is no well-defined dividing line between the pathogenic and non-pathogenic bacteria. Over 150 species of bacteria have been classed as pathogenic; in addition, there are 300 species of organisms classed as non-pathogenic for lack of information as to their disease-producing power.

It would be impossible in the manipulation of dressing material to separate or remove harmless bacteria from those which are virulent. Therefore, in order to meet the requirements of surgery, the methods of manufacture must provide that the dressing material shall be free from all forms of bacteria. Antiseptic dressings, as ordinarily prepared, do not meet this demand. The antiseptic agents commonly used in dressing wounds do not possess the power to kill or destroy micro-organisms. It has been demonstrated that dressings impregnated with antiseptics may still harbor germ life, and thus be the means of carrying infection to a wound. Antiseptic dressings must therefore also be made aseptic or surgically clean.

Surgical authorities, in recent discussions, have raised the question as to the relative fitness of the surgeon, the pharmacist and the manufacturer, as makers and purveyors of surgical material. We may well claim for the American physician the highest of honors. We should all but reverence the skill and genius of the American surgeon. Yet, upon reflection, it must be admitted that their offices are not, as a rule, the most suitable spots for the preparation of dressings. Constant contact of their furniture and paraphernalia with the clothing and persons of patients carrying contagions of every name and kind, together with the thousand and one avenues through which streams of infectious matter pour into their rooms, is evidence of the unfitness of such surroundings for the production of surgically clean dressings.

Likewise in hospitals, many of which are attached to medical colleges where students and professors gather fresh from the dispensary clinic or visits to infected houses, from the dissecting-room and from hundreds of sources of contagion, the dangers of infection can scarcely be avoided.

When dressings are prepared by the pharmacist, the work is of necessity performed in the druggist's back room,—a place which comes far short of conditions known as surgical cleanliness. The pharmacist, though ordinarily clean in person and habits in the pursuit of his calling, is far from aseptic. Like the physician, he is constantly in contact with infection through the person of his patrons.

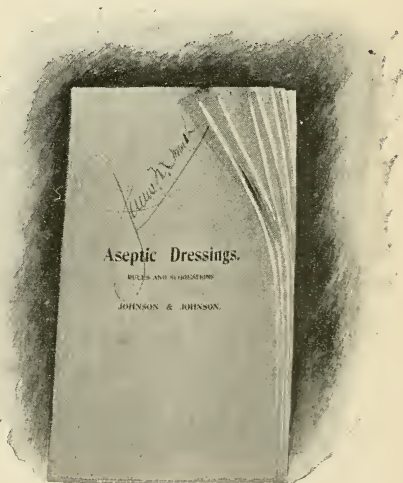
The facilities of the manufacturer, whose whole organization is adapted to the production of surgical dressings, are certainly more perfect than those of the surgeon, to whom such work is incidental. The environment of a room from which pathogenic organisms and septic matters are entirely excluded, is superior to that obtained in the hospital or in the doctor's office. Rooms in which no work is undertaken except the handling of aseptic material will certainly be more nearly surgically clean than those to which infection has constant access.

Persons whose only calling is that of preparing surgical material, who have been schooled in the principles underlying the infection and disinfection of dressings, are probably more competent to handle dressings than the doctor's student or his attendants, to whom such work is of necessity relegated. In this work, as in many other instances, properly constructed apparatus is more efficient, more cleanly, and more perfect than hand-work.

Further, an organization devoted exclusively to the manufacture of dressings, once having the details arranged to prepare a yard of dressing, can produce any number of yards more perfectly than if done as occasion may require as is the rule in the hospital or in private practice.

To the manufacturer and dispensing pharmacist is due the credit of having made possible the universal application of the principles of modern surgery. They have placed in the hands of the practitioner appliances that fulfil every requirement of the advanced art of surgery.

We hold that the preparation, selling and dispensing of medicinal and surgical supplies to the physician, to the surgeon and to the public belong to pharmacy. Their application is the province of the practitioner of medicine and surgery, and we maintain that it will be to the betterment of surgery to receive all dressing materials from the hands of a competent pharmacist.



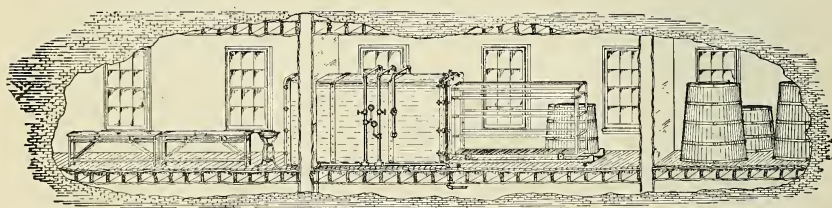
Aseptic Laboratories.

FOR the production of dressings suited to the requirements of surgery Johnson & Johnson have established a series of laboratories planned and built for the sole purpose of making surgically clean dressings.

They consist of buildings where the crude materials, such as gauze cloth, cotton, etc., are cleansed, rendered absorbent, bleached, and fitted for surgical purposes.

Rooms for cleansing containers, jars and fittings; chemical and bacteriological laboratories, and, finally, a suite of disinfecting and aseptic operating rooms.

They are admirably situated away from busy streets. For miles on either side stretches of river and meadow land secure an almost dustless atmosphere. In fitting up the rooms the ideas kept in view were the exclusion of bacteria and the easiness of keeping clean.



The cut above gives an outline idea of the rooms wherein dressings are made aseptic. The one to the right is the preparation room. In practice it is really more than one room, but for convenience of illustrating it is put down as one. Here in these rooms the dressings are cleaned, rendered absorbent and bleached. They are then brought to the sterilizing room, impregnated with chemicals when required. (See pages 8 and 9.) To the same point are also brought the containers and tops fresh from a bath in the hot soda solution.

The work of handling and packing dressings is done in the aseptic room, which is aseptic in name and in fact.

The walls and ceiling are glass smooth. The floors are filled and polished. There are no closets or shelving, no cracks or crevices to harbor dust or dirt.

The furniture consists of glass-topped tables on iron frames, which allow effectual and easy cleansing.

Everything, whatsoever may be its nature or history, outside of this room, is considered as infected (though in fact it may be free from germ life); it is, therefore, disinfected before being taken into the room. The entrance to this room is through an anteroom, which is a disinfecting station of the highest type. Through this quarantine all persons and things pass before entering the aseptic room.

The inanimate objects pass through the sterilizer elsewhere described. The operatives undergo a vigorous personal cleansing and change of clothing.

RULES AND SUGGESTIONS.

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The Aseptic Room.

The name of this room implies that the room and everything in it is aseptic, or surgically clean, at all times.

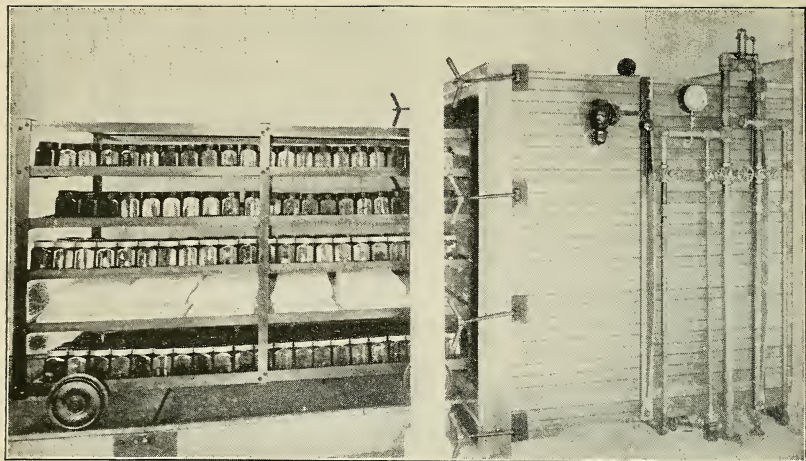
Everything outside of the aseptic room, everything and everybody passing into the aseptic room from the outside are to be regarded as infected until subjected to special cleansing operations. Everything required for use in the aseptic room, before being carried in must be sterilized according to the prescribed rules.

Employees, messengers, etc., from other departments must not be allowed admission to this room under any circumstances.

Visitors may only be admitted by express permission from the office, and then only when under the direction and charge of the nurse in charge of the room. Under no circumstances must visitors or any other persons be allowed to mingle with the operatives, to touch the tables, dressings, or apparatus.

All materials and articles sterilized in the steam chambers must be received into the aseptic room through the door opening from the sterilizer into the aseptic room.

All sweeping, dusting, etc., of the aseptic room must be done at the close of the day's work. As far as possible, all finished goods must be removed. Tools, apparatus, towels, aprons, aseptic clothing, etc., placed in the sterilizing chambers. All large apparatus and tables covered with impervious antiseptic cloth. The floor must be well moistened before sweeping. Dusting *must be done with damp cloths only*. After sweeping and dusting, the covers of the tables must remain for at least eight hours. As often as it may be deemed necessary, the entire wood and iron work of the room must be washed with soap and water, then with antiseptic solutions, and the room closed and fumigated with sulphur and currents of steam.



Sterilization.

THE equipment of these laboratories provides for the use of steam, formaldehyde and sulphur dioxide vapors, together with chemical and mechanical processes. The principal agent employed is saturated steam. In the vacuum process as here utilized, steam unmixed with air, passing in currents under pressure through the dressings, gives the sterilization efficiency of actual boiling in water.

The main sterilizing chamber was constructed especially for this class of work after our own models. The dressings and containers, having been prepared, are put on an iron carriage and run into the sterilizing chamber. This chamber forms a part of the dividing wall between the sterilizing and aseptic rooms. It is rectangular in form, large enough to hold a wagon load of goods. It is constructed with thick walls of metal and asbestos covered with wood. The interior is lined with perforated steam pipes for producing live steam, and radiators for producing heated air within the chamber. Doors to the chamber open at both ends, one into the sterilizing room and the other into the aseptic room. These doors are made steamtight.

The chambers are fitted with steam supply and escape connections, gauges for pressure and vacuum, safety valves, exhaust valves, etc. Iron cars, with trays, carry the articles to be treated. Supply pipes controlled by valves admit live steam to the interior of the chamber. The actions involved in the operations in the chamber are:—

(a) Preliminary warming of the materials to prevent condensation. (b) Removal of air. (c) Circulation of saturated steam unmixed with air under pressure through every fibre of the material, subjecting them to the highest possible action of this agent. (d) Subsequent exhaustion of steam and substitution of heated air.

The dressings are passed into the chamber; heat is turned on. The air is then exhausted until a good vacuum is formed; saturated streaming steam is then let in until the temperature reaches 240 degrees, and the pressure gauge indicates 5 or 10 pounds. The steam pipes are then closed and the vacuum pump is again started until the proper vacuum is obtained. Again steam is turned on, and so on in turn currents of saturated steam follow each other back and forward through the vacuum for from one to two hours. From the sterilizing chamber the dressings pass directly into the aseptic room.

The following rules govern the use of this sterilizer:—

RULES AND SUGGESTIONS.

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Sterilization.

Processes prescribed for sterilization are to apply to things of any nature carried into the aseptic operating room for any purpose whatsoever.

Sterilization in all cases must be conducted according to the prescribed rules, from which no deviation must be made under any circumstances.

Sterilization temperatures shall be for dry heat, 250–270 degrees for at least three hours. Moist heat saturated streaming steam under vacuum of at least 12 inches and a pressure of 5 to 10 pounds at a temperature of not less than 220 degrees for at least one hour.

Processes.

All jars, together with their covers, fittings, fastenings, and all things washable, are to be washed with soap and hot water, or, when necessary, boiled in soda solution, and immediately passed into the steam sterilizing chamber, sterilized by steam, and remain in the chamber until ready for use.

Materials for dressings (cotton, gauze, wool, etc.), after being bleached and rendered absorbent, etc., are to be carried into the sterilizing chambers, sterilized by steam, and remain in the chamber until ready for use.

Dressings which are to be impregnated with antiseptics or medicated, are first to be prepared by a preliminary cleansing and sterilization, then dipped in the proper solution, wrung out and placed in suitable containers, and passed into the sterilizing chamber.

All other material and things to be first cleansed by the prescribed methods, thence immediately passed into the sterilizing chambers to be sterilized either by dry or moist heat or by vapors of formalin, or both, and to remain in the sterilizing chambers until ready for use.

Tools, small apparatus, towels, aprons, aseptic clothing, etc., that are to be used in the aseptic room, before being carried into the room, and each day while in use before beginning work, are to be placed in the sterilizing chambers, sterilized by steam, and not removed from the chambers until needed for use.

Operatives in Asepsis.

REALIZING the importance of skilled operatives in the making of surgical dressings, we select our operatives from among those who have successfully passed a course of training in the principles as well as the details of the work.

In our laboratory such a course consists in daily manual training under experienced operatives and additional attendance upon stated instructions.

In the course of instruction, demonstrations of the processes, with an explanation of the principles involved, are made. The course is made thorough by the use of text and reference books, questions and experiments. Among the subjects treated are :—

1. THE WORK OF PREPARING SURGICAL MATERIALS * ITS IMPORTANCE, ITS REQUIREMENTS.
2. DEFINITION AND MEANING OF TERMS.
3. NATURE OF THE MATERIALS USED IN SURGICAL DRESSINGS. (FIBRES, CLOTH, LIGATURES, ETC.)
4. PREPARATION OF MATERIALS, RENDERING ABSORBENT, BLEACHING, ETC.
5. KINDS OF DRESSINGS USED IN MODERN SURGICAL PRACTICE.
6. USES TO WHICH DRESSINGS ARE PUT IN SURGERY.
7. BACTERIA : THEIR NATURE, CONDITIONS OF GROWTH, MULTIPLICATION, PRODUCTS OF THEIR ACTIVITY, WITH DEMONSTRATIONS OF THE MEANS BY WHICH THEY MAY BE TRANSFERRED TO AND FROM PERSONS AND THINGS.
8. WOUND INFECTION.
9. INFECTION OF DRESSINGS.
10. DISINFECTION : CHEMICAL AND PHYSICAL AGENTS.
11. EXCLUSION OF BACTERIA.
12. STERILIZATION.
13. DISINFECTION OF PERSONS AND THINGS.
14. ASEPSIS AND ASEPTIC TECHNIQUE IN THE PREPARATION OF DRESSINGS.

In addition, the operatives are taken at stated periods to hospitals, in order to become familiar with the requirements of the surgeon

The following books are used for reading and reference :—

GAUZE DRESSINGS IN SURGERY.—*Johnson & Johnson.*

TEXTBOOK OF NURSING.—*Weeks Shaw.*

MODERN METHODS OF WOUND TREATMENT.—*Johnson & Johnson.*

THE RULES OF ASEPTIC AND ANTISEPTIC SURGERY.—*Gerster.*

ANTISEPSIS AND ANTISEPTICS.—*Buchanan.*

THE ASEPTIC TREATMENT OF WOUNDS.—*Schimmelbusch.*

MANUAL OF BACTERIOLOGY.—*Crookshank.*

MANUAL OF BACTERIOLOGY.—*Sternberg.*

SURGICAL ASEPSIS.—*Beck.*

The operatives who have to do with the handling and preparation of surgical material in our laboratories are skilled in the value and conditions of asepsis. In addition they are at all times under the direct supervision of graduate surgical nurses.

Throughout this pamphlet are reproduced pages from the code of "Rules and Suggestions" which govern the actual work of handling and the preparation of surgical dressings in our laboratory.

The following page illustrates the rules employed to secure personal cleanliness:—

Personal Cleanliness.

Of each individual will be required at all times general personal cleanliness, such as follow frequent bathing, clean clothing, cleanly habits and practises. (Persons having any form of skin disease, or sores, catarrhal troubles, etc., will not be allowed to engage in this work.)

Employees in whose family there exists any contagious disease must report the same in order to allow proper provision to be made in their case.

Every person who enters the aseptic operating room must put on the prescribed washable garments, covering the hair with a suitable cap. Flowers, ornaments and jewelry must be removed. Before entering the aseptic room they must wash their face and thoroughly scrub their hands, forearms and face according to the prescribed rules.

Hand Disinfection.

Cleansing of the hands and keeping them clean is imperative in handling surgical dressings. Cultivate practises of aseptic cleanliness in regard to the hands. Keep the nails short and smooth by trimming and polishing, giving particular attention to the spaces beneath the nails, margins and parts of the nail on the back of the finger. Before handling any sterilized material, the prescribed processes of hand disinfection will be required:

PRELIMINARY WASHING.

Before entering the aseptic room.

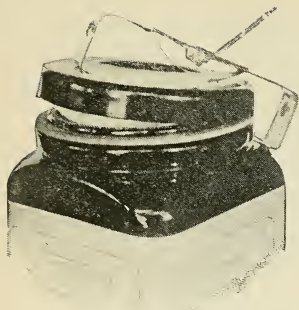
1. Wash the face and scrub hands and forearms with solution of ammonia, soap and a disinfected brush; rinse in clean hot water and dry on a sterilized towel.

Hand Sterilization.

After entering the aseptic room, and when ready for handling sterilized material, (1) scrub the hands in soap and ammonia, rinse in clean water, and, without drying, (2) rinse in a solution of oxalic acid, (3) follow by rinsing in soda solution then in alcohol, (4) finally wash in soda solution without drying.

Operatives leaving the room or touching any non-sterile object, must rewash their hands according to these methods before again handling sterilized material.

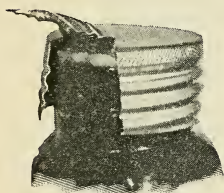
Aseptic Handling—Hermetic Sealing.



JAR DURING STERILIZATION.

IN these laboratories the work of handling dressings and packing in their containers is performed in the aseptic

room. Before beginning the work, all tables and such apparatus as may come in contact with the dressings are thoroughly washed in antiseptic solutions and wiped with sterilized cloths. Movable apparatus, tools, etc., are sterilized in the sterilizing chambers. The operation of cleaning the room is required to be completed before aseptic clothing is put on, and hands made aseptic before handling or exposing to the dressings



JAR CUT AWAY TO SHOW OPENING DURING STERILIZATION.

The work of handling, folding and packing is performed as quickly as possible. Immediately upon being packed, the dressings are covered and placed in the sterilizing chamber for resterilization.

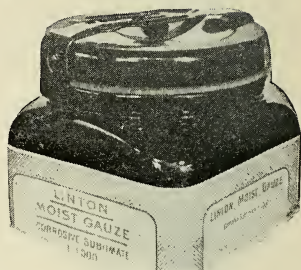
This resterilization effectually secures absolute safety against the remote possibility of infection by handling. After this final resterilization, the jar seals are locked. In the case of dressings packed in glass jars, this process is one of hermetic sealing, a partial vacuum having been formed within the jars during the heating and cooling.

It is made an inviolable rule, no container is to be opened for any purpose during or after this resterilization process; the following being the working rule in this respect:—

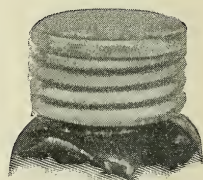
All finished dressings, after being packed in their containers and covered, must be placed in the sterilizing chambers to be resterilized and sealed.

After such final sterilization, no container must be opened or exposed under any circumstances.

(If accidentally opened or exposed, the package must at once be marked "Not sterile," and passed back for resterilization.)



JAR HERMETICALLY SEALED.



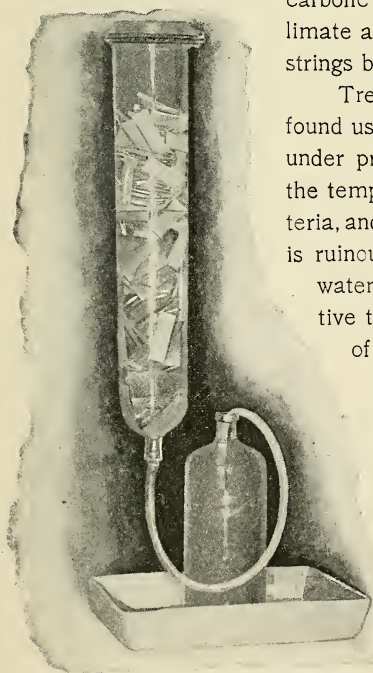
JAR TOP SCREWED DOWN AFTER STERILIZATION.

Aseptic Ligatures.

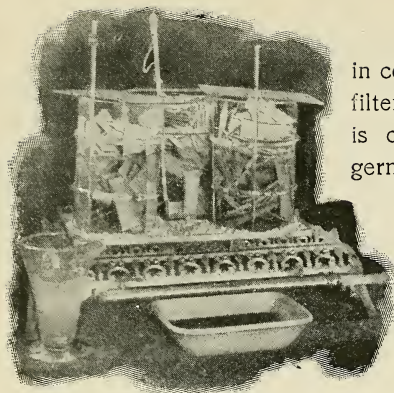
THE importance of thoroughly aseptic material for suturing and ligaturing need not be emphasized. Silk and other non-absorbable ligatures are easily rendered aseptic, but since the introduction by Lister of prepared absorbable intestines, the disinfection of this material has been a vexing problem. Catgut, so called, is the under mucous membrane of sheep twisted into cords. The nature of the material and its source shows that the catgut of the market must of necessity be laden with bacteria. From the prevalence of anthrax and other diseases among sheep, it is but natural that disease germs should be found within the tissue. We also note that this gelatinous material is most easily infected by the transference of germs during its handling and manipulation. In the great variety of methods suggested for the preparation of gut ligatures, none have produced absolutely aseptic ligatures without affecting the absorbability, the strength, or in some way marring the integrity of the material. Experience has proved that soaking the ligatures in antiseptic oils is insufficient, as is the treatment with chromic and carbolic acid. Treatment with corrosive sublimate and other strong antiseptics renders the strings brittle.

Treatment with formalin has likewise been found useless. The method of boiling in alcohol under pressure has been found impractical, as the temperature, 148, is not destructive to bacteria, and a higher temperature under this process is ruinous to the material. Steam and boiling water are inapplicable; dry heat is destructive to elasticity and firmness. As the result of many years of continuous study, we have devised a series of processes that have been proved effectual for sterilization of the gut, as well as to exclude every possible source of contamination by handling. These processes are substantially as follows:—

1. Exterior cleansing of the ligatures by scrubbing.
2. Removal of moisture.



EXTRACTION OF LIGATURES WITH SOLVENTS.



BOILING RED CROSS LIGATURES.

3. The ligatures are next wound in coils and sealed within a toughened filter-paper envelope. This envelope is closed with antiseptic cement, is germproof, but allows the disinfecting solutions afterward used to pass through. After the ligatures are sealed in this envelope, they are not touched by any hands until they reach the surgeon.

4. Successive percolations with solvents, naphtha, ether, benzol, alcohol, etc., for the removal

of dirt, blood, foreign material, etc., within the tissue of the gut. These processes are in themselves destructive to germ life.

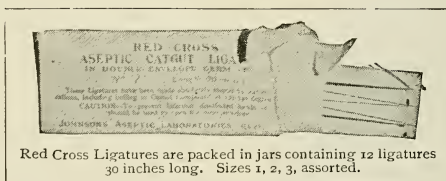
5. Sterilization by boiling in a solution of cumol compound at a temperature of 320–340 Fahrenheit.

6. Removal of cumol solution.

7. Sealing in a second or outer envelope and final packing in sterilized glass jars.

All these processes are conducted under rigid systems of asepsis. The ligatures are so packed that they cannot become infected during their sale and distribution. One or more ligatures can be removed from the package without touching or infecting the remainder.

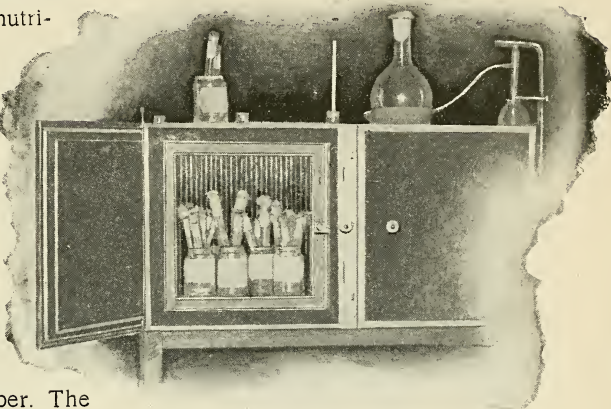
Thorough bacteriological tests have shown the efficiency of this method of sterilization. Ligatures purposely infected with the anthrax, as well as the more common wound-infecting organisms, after passing through these processes have been found to be absolutely aseptic. The procedure in no wise affects the texture of the ligatures, but rather increases their tensile strength and elasticity.



Bacteriological Tests.

THE products of our aseptic laboratories are subjected to bacteriological tests to check efficiency of sterilization processes. the procedure being substantially the following :—

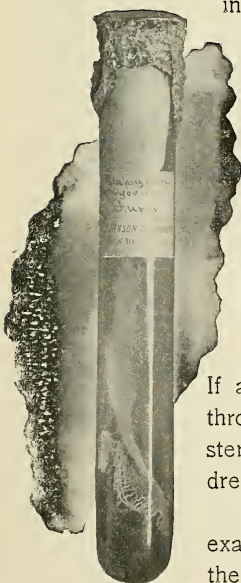
A portion of the dressing material (for example, a piece of gauze) is impregnated with an infected nutrient fluid. The thus infected material is then dried in air. As a check experiment, a portion of this infected and dried material is placed in sterilized nutrient jelly in the culture chamber. The remaining portion of the



infected material is then passed through the sterilization process. care being taken that it passes through like conditions as would the sterilized dressings.

After a suitable time (at least three days), if a growth is found in the check experiment, we are certain that the test material was infected. If no growth has taken place in the infected material that has passed through the sterilization processes, we are certain that sterilization has been complete in all the dressings. This conclusion needs no verification. The dressings have been prepared and sterilized by methods which exclude contamination. If a portion of material purposely infected, in passing through the sterilization process with them, is rendered sterile it is conclusive proof that the whole of the dressings cannot fail to be sterile and aseptic

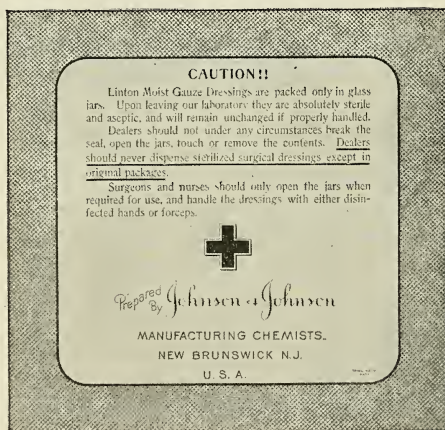
These tests are supplemented by microscopic examination and thermometric tests to further establish the efficiency of the process.



Surgical Dressings in Commerce.

THE principles of surgical asepsis are applicable to the dispensing and sale of surgical material. Many surgeons have condemned the use of ready-made products as sold in the drug store where the gauge of success is purely commercial directed solely to profit, deeming that under such conditions the requirements of surgery are matters of indifference, generally matters of ignorance.

In dispensing surgical dressings the responsibility of the surgeon is shared by the pharmacist. The integrity of the dressing is of supreme importance, and any neglect in its preparation, any misstep through ignorance, stupidity or cupidity of any who have had to do with its history, is sure to be revealed. The issue of life or death in such a case should not be subject to the market rates per pound or yard.



The practice of some dispensers, who open packages of dressings, measure and weigh them over dusty counters, with unclean hands, cannot be too strongly condemned. The importance of the surgical dressing, the nature of its requirements, call for the greatest care. There is no article in the druggist's stock which calls for greater care and judgment. Upon every yard of gauze, sponge or ligature dispensed hangs, perhaps, the life or death of the patient or the reputation of the surgeon. They should be guarded from every source of

direct or indirect infection. A closet, a room or a case that is cleanable should be provided for their reception. It should be cleaned often, and kept clean. They should be sold within the containers in which they are packed at the time of their preparation. The containers should never be broken open for sale or for any other purpose. They should be delivered to the surgeon so perfect that there can be no question as to their integrity, placing all responsibility for their subsequent care in his hands. In dispensing to the public every purchaser should be cautioned as to their nature and instructed in the handling and use. The price should meet the cost of the dressing plus a profit which will cover the cost of service, advice, trouble and care.

RULES AND SUGGESTIONS.

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DON'TS.

Don't allow a dressing to touch your person or clothing, unprepared tables, tools, or apparatus.

Don't touch any other person.

Don't touch a dressing with hands that are not surgically clean.

Don't, while handling dressings, touch your hands to your clothing, face, hair, eyes, or mouth.

Don't allow perspiration to drop on tables or dressings.

Don't cough or sneeze over the dressings or tables.

Don't carry or use a pocket handkerchief.

Don't put anything in your mouth.

Don't wear flowers, ornaments, jewelry, or rings.

Don't pick up any dressing or thing that has fallen to the floor.

Don't use anything that has fallen to the floor without sterilizing it.

Don't fail to have everything surgically clean before you use it.

Don't touch anything that has not been made sterile without rewashing the hands.

Don't be afraid to wash your hands often; they will not wash away.

Don't allow persons who have not prepared themselves to touch a dressing or anything used in their preparation.

Don't go out of the room and come back again without as thoroughly rewashing as when you first entered.

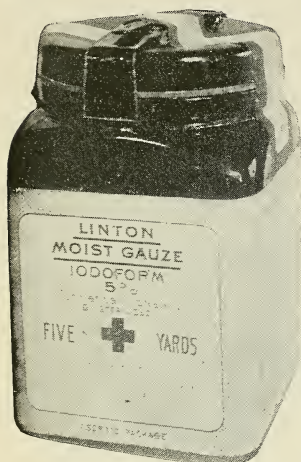
Don't be afraid to be particular about everything you do or touch.

Don't handle anything when it is not necessary to do so.

Linton Moist Gauze.

THESE dressings are made antiseptic and aseptic under our advanced systems of aseptic technique, during which the dressings pass through the following processes:—

1. Rendering absorbent, and bleaching. A prolonged and intricate series of chemical and mechanical operations, such as boiling and steeping in alkaline baths to saponify oils, waxy and pectose matters contained in the natural fibre. Baths to remove the saponified products, bleaching in chemical baths, followed by washing and removal of all chemicals. Lastly, drying and sterilization by moist and dry heat.



2. Preliminary sterilization of the glass jars or other containers in which the dressings are to be packed, in hot soda solutions.

3. Impregnation of dressings with antiseptics.

4. Sterilization of the dressing materials, the containers, tops, fittings and all other things belonging thereto by saturated steam in vacuo.

5. Packing of the dressings in their containers under rigid systems of aseptic

technique, during which the covers are laid on loosely and the finished dressings passed again into the sterilizer.

6. Resterilization of the finished dressings within the containers.

7. Hermetic sealing during the final sterilization.

The experience gained since the origin and perfection of the Linton Moist Gauze Dressings has abundantly proven that the principles governing their production is the only rational and scientific basis for the production of perfect wound-dressings.

Every yard of Linton Moist Gauze is guaranteed if the jar seal is unbroken, otherwise the contents are not guaranteed.

Linton Moist Gauze.

Packed in one-yard and five-yard jars.

Borated Gauze—Linton Moist.

Carbolated Gauze—Linton Moist. 5 per cent

Corrosive Sublimate Gauze—Linton Moist. 1—1000.

1—2000.

Iodoform Gauze—Linton Moist. 5 per cent. 10 per cent. 20 per cent.

Boroform Gauze—Linton Moist. Substitute for Iodoform.

Cyanide Mercury and Zinc Gauze—Linton Moist. Lister's formula.

Aseptic Gauze—Linton Bi-sterilized.

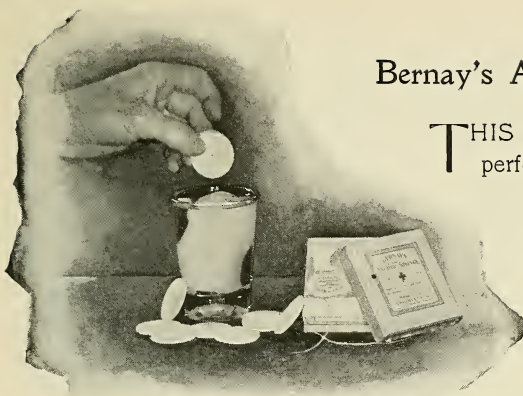
Pryor's Gauze—Linton. Iodoform 10 per cent.

Johnson's Aseptic Cotton—Bi-sterilized. One ounce and quarter-pound packages.

Linton Gauze Bandages—Sterilized. From one to four inches wide.

Red Cross Ligatures—Silk and Catgut In bottles 12 ligatures, sizes 1, 2, 3.

Bernay's Aseptic Sponges. Boxes containing 48 sponges



Bernay's Aseptic Sponge.

THIS absorbing material is the perfection of the suggestions of Prof A. C. Bernay, St. Louis, Mo. The Bernay sponge is made of cotton fibre prepared for the purpose and compressed into disks of convenient shape and size for absorbing. The

absorbing power of these sponges is much higher than that of gauze cotton, or sea sponge.

A Bernay sponge, one inch in diameter, when dropped in water, absorbs the liquid and extends to more than fifteen times its size, absorbing twelve times its weight of fluid.

The sponges are made absolutely aseptic by compression and subjection to disinfecting vapors. They are packed in sealed and sterilized packets of one dozen sponges. Four packets (48 sponges) enclosed in a sealed box. One packet can be used without infecting the remainder.

Bernay's sponges will be found a perfect substitute for the dangerous and annoying sea sponge, and will fulfil the requirements of surgery, viz., high absorption, perfection in sterility and asepsis economy and convenience.

Absorbent Cotton, Absorbent Gauze, Linton Aseptic Bi-sterilized.

THESE products are prepared to fill the demands of surgery which call for a plain or unmedicated dressing that is absolutely sterile and aseptic. Their preparation involves a series of processes where, by special automatic machinery, the fibres are mechanically cleansed coloring and foreign matters are extracted and washed away, the fibre rendered absorbent and bleached.

The material is handled and packed under the systems of asepsis and double sterilization previously described, including resterilization by steam in vacuo and hermetic sealing. The products are ready for use without sterilization or other preparation

Pryor's Gauze.



"PRYOR'S GAUZE."—IODOFORM.

Prepared under the directions of Prof. Wm. R. Pryor, College of Physicians and Surgeons, N. Y. City, 1881; Professor Gynaecology N. Y. Polyclinic; Visiting Gynaecologist St. Elizabeth's Hospital; Member N. Y. Obstetrical Society, Fellow Academy of Medical Society Alumni Bellevue Hospital and N. Y. Pathological Society; Founding Member International Periodical Congress Obstetricians and Gynaecologists; Consulting Surgeon City Hospital; co-Author "Text Book of American Gynaecology."

THIS gauze, as prepared by us under the directions of Prof. Wm. R. Pryor, with authority to place it before the profession, deserves preference over any other form of iodoform dressing, in that it possesses the advantage of giving an increased and continuous action to the iodoform as an antiseptic,—furnishes a dressing of great simplicity and safety, one that is always aseptic and, above all, is perfectly non-poisonous.

The various steps of the procedure include the preliminary preparation and sterilization of fine-mesh absorbent gauze, impregnation of the prepared gauze with a ten per cent. solution of purified iodoform in volatile solvents. The cells of the gauze fibre are completely saturated with this solution, and upon evaporation of the solvents are left completely filled with the antiseptic. The impregnated fibre is then passed through a weak boiling solution (1-4,000) of mercuric chloride, which acts as a mordant-like agent (fixative); the mercuric chloride is decomposed in the reaction.

The dressing is finally packed in sterilized containers, steam sterilized in our vacuum sterilizing chamber during which the jar is hermetically sealed.

The entire process is conducted according to the rules of the most precise technical cleanliness. The formula insures an iodoform dressing of the greatest absorbency and having the highest antiseptic properties. By the use of iodoform in a complete solution, "not in an emulsion or mixture," it is held in more than a mere mechanical association with the meshes of the gauze, but is carried within the cellulose structure of the gauze fibre. The iodoform is therefore not washed away from the fibre by wound secretions.

The gauze is perfectly non-poisonous, non-irritating, does not decompose in septic wounds. The dressing does not require as frequent change as do other iodoform applications. The dressing is ready for use without further preparation.



Aseptic Armamentarium.

TO AID in the successful application of the principles of perfect surgical technique, we have grouped a list of such aseptic dressing materials as have been suggested as essential for the purpose. The surgeon, provided with this outfit, as far as the dressings may be a factor, may rest perfectly assured of the certainty of results.

ASEPTIC ARMAMENTARIUM.—PRICE \$5.00.

1. Two pounds Johnson's sterilized aseptic cotton (in $\frac{1}{4}$ -pounds)
2. One dozen 2-inch Linton gauze bandages (sterilized).
3. One 5-yard jar Linton sterilized aseptic gauze.
4. Three yards Linton bi-sterilized iodoform gauze, in 1-yard jars.
5. One bottle Red Cross catgut aseptic ligatures, containing one dozen ligatures 30 inches long.
6. One bottle Red Cross aseptic silk ligatures, containing one dozen ligatures 30 inches long.
7. One box Bernay's aseptic sponges, containing 48 sponges.
8. One package Red Cross antiseptic soap.

All of the articles illustrated on this page can be furnished by any druggist in the U. S. for \$5. Where surgeons cannot procure this aseptic armamentarium of their druggist, we will send the same, express paid, upon the receipt of the amount in current funds.



Antiseptic Soaps.

THE importance of reliable and truly antiseptic soaps for surgical purposes, for general disinfection, and the treatment of skin diseases, has led us to the production of a line of antiseptic soaps. Our present line is as follows:—

Red Cross Soap

Contains as its active constituents 10 per cent. of camphenol (a combination of camphor, phenol and cresol).

Camphenol is an antiseptic, deodorant, germicide and bactericide, far superior to carbolic acid, lysol, creolin, etc.

Red Cross Soap exhibits the superior disinfecting and antiseptic properties of camphenol in a form convenient for use. It is par excellence for use in bathing patients under treatment for infectious disease, for baths for nurses and attendants, and for the effectual disinfection of persons' clothing in preparing for and during an operation.

One-fourth cake of Red Cross Soap dissolved in two pints of boiling water forms an antiseptic solution of the greatest utility in wound treatment,

This solution is useful for washing the field of operation; to cleanse operating table, utensils; to cleanse instruments before and after operating (non-corrosive); for immersion of instruments during operation; to be added to the water in which instruments and dressings are boiled and sterilized; for disinfecting hands of operator and attendants preparatory to and after operation; for washing ulcers, old sores, irrigation of sinuses, etc. Red Cross Soap Solution is also useful for immersion of sponges and as an adjunct to their cleansing and disinfecting by other means.

Emergency Dressings can be easily prepared by boiling cloths, lint, or other suitable fabrics in a strong suds made of Red Cross Soap. One-fourth cake of Red Cross Soap

dissolved in two pints of water forms an antiseptic solution into which bandages, lint, gauze, cotton, etc., may be dipped and wrung out to form antiseptic dressings in emergency cases.

The foregoing solution diluted with an equal bulk of water is a useful solution in the lying-in room, washing the genitals, for douches, irrigation, moistening dressings, pads, for use in gynæcological work, etc.

"The ideal state of perfect asepsis is very closely reached by the aid of the Red Cross Soap."

Johnson's Tar and Witch-Hazel Soap.

For the toilet and bath, for washing infants with tender skin; for the complexion, hair and scalp, for skin diseases, chapped hands, etc.

Johnson's Carbolic Soap.

For physicians', surgeons' and nurses' use, itching, skin troubles, insects' stings, etc.

Johnson's Corrosive Sublimate Soap.

For syphilitic sores, skin diseases, and infected wounds.

Johnson's Sulphur Soap.

For salt rheum, itching, scabies, acne, dandruff, pimples, blotches, freckles, etc.

Johnson's Borated Soap.

An excellent shampoo soap, excellent for the complexion, chronic skin diseases, etc.

Johnson's Ichthyol Soap.

For lupus, eczema, ringworm, frostbites, and for massage in rheumatism and gout.

JOHNSON & JOHNSON, New Brunswick, N. J.

Bibliography.

JOHNSON & JOHNSON.

THE following is a list of the principal monographs, booklets, etc., of scientific interest which have been issued from our laboratory for circulation among physicians and pharmacists, etc.

It is given in answer to constant requests from physicians and pharmacists for copies, etc., of our publications.

This list does not include issues of a purely commercial nature, such as price lists, catalogues, cards, circulars, etc.

The publications marked with a star (*) are now out of print. Copies of any publication not so marked will be forwarded upon application.

JOHNSON & JOHNSON, New Brunswick, N. J.

SURGICAL DRESSINGS.

*Modern Methods of Antiseptic Wound Treatment.

Compiled from the notes and suggestions of D. Hayes Agnew, M. D., LL.D.; A. C. Bernays, M. D., M. A.; John B. Deaver, M. D.; John D. S. Davis, M. D.; Hunter McGuire, M. D., LL.D.; Thos. G. Morton, M. D.; N. Senn, M. D.; Stephen Smith, M. D.; Lewis A. Stimson, M. D.; J. Wm. White, M. D. Monograph, 48 pages. Five editions; the first edition, issued in 1887, was the first comprehensive Manual of Antisepsis published in this country.

*Old and New Antiseptic Dressings.

Leaflet, 8 pages.

*Antisepsis and Asepsis.

A reply to Lister and Gerster. Monograph, 10 pages.

*King Cotton.

Booklet, 10 pages.

Gauze Dressings in Surgery.

Method of preparation, formula, standard, etc. Monograph, 28 pages.

Surgeons' Memoranda of Dressings, Etc., Needed for an Operation.

By John B. Deaver, M. D. 4 pages.

Uses of Lintine.

Leaflet, 4 pages.

*Gauze Question.

The meaning of percentage, modern methods of preparation, tests, etc. Leaflet, 8 pages.

*Boroglyceride.

By Dr. J. Thornton Parker. Leaflet, 8 pages.

*Anal Antisepsis.

Robt. Wilkie Martin, M. D. Leaflet, 4 pages.

*Fistula in Ano.

Antiseptic care following operative procedure. J. J. Edmondson, M. D. Leaflet, 4 pages.

Kingston Catheters and Bougies.

Suggestions for sterilization and care. Leaflet, 8 pages. Illustrated.

Kingston Catheters and Bougies.

Colored chart, showing size, shape, etc. 4 pages, folio.

*Suspensory Bandages.

Colored chart.

"Every Man Should Wear One."

Suspensory bandages. Leaflet, 4 pages.

Bernay's Aseptic Sponges.

Leaflet, 4 pages.

Simpson's Maternity Packet.

Leaflet, 4 pages.

*Woven Elastic Bandages.

Leaflet, 2 pages.

Boroform Gauze.

Leaflet, 2 pages.

Aseptic Handbook.

Suggestions on handling and dispensing surgical dressings. Booklet, 24 pages. Illustrated.

Aseptic Dressings.

Rules and suggestions. Handbook used by operatives in J. & J. laboratories.

Modern Surgical Dressings.

Address by F. B. Kilmer before Alumni Philadelphia College of Pharmacy Monograph, 16 pages.

Asepsis Secundum Artem.

The practical application of the art of Asepsis to the preparation of Surgical Dressings. Illustrated. Monograph, 24 pages.

DRUGS, PHARMACY, ETC.

*Belladonna Illustrated.

A study of its history, actions and uses in medicine. Contributions from Henry Kraemer, Ph. G.; Chas. Rice, Ph. D.; Prof. John H. Maisch, Prof. J. U. Lloyd, J. P. Remington, Ph. M.; R. G. Eccles, M. D.; H. C. Wood, M. D.; W. C. Caldwell, M. D.; Prof. John B. Smith, Prof. A. R. L. Dohme, Robt. W. Johnson, and others. Translations, Abstracts and Therapeutic Index from leading authors. Edited by F. B. Kilmer. Monograph, 48 pages. Illustrated.

*We Make Them.

Mustard Plasters. Booklet, 10 pages.

*A New Cantharidal Plaster.

Leaflet, 4 pages.

*Points Aimed At.

Belladonna Plasters. Booklet, 10 pages.

*Mustard in Therapeutics.

By A. H. Laidlow and T. H. Laidlow, M. D. 8 pages.

*Improvements in Pharmacy.

Leaflet, 4 pages.

When and Where to Use Mustard Plasters.

Leaflet, 8 pages.

*Blisters and Blistering.

Booklet, 8 pages.

*New Preparations.

Leaflet, 4 pages.

*Modern Methods of Local Treatment in Skin Diseases.

Monograph, 48 pages. From the notes and suggestions of Geo. Henry Fox, M. D.; James Nevins Hyde, M. D.; Arthur Van Harlinger, M. D.; Henry G. Piffard, M. D.; A. V. N. Baldwin, M. D.; P. G. Unna, M. D.; N. Von Zemisson, Prof. H. Auspitz, M. D.; Prof. E. Geber, M. D.; Ernest Veiel, M. D.; Prof. Ernst Schwimmer, M. D., and others.

A Book With a Mission.

Disinfection and care of contagious diseases. Booklet, 36 pages.

When and Where to Blister.

The therapy of blistering. Illustrated. Booklet, 21 pages.

Johnsonia.

Antiseptic Soaps, Fumigation, etc. Illustrated. Booklet, 32 pages.

*Recent Therapeutic Notes on the Use of Papoid in the Treatment of Dyspepsia and Diphtheria.

Monograph, 32 pages.

*Kola Illustrated.

A Study of its History, Physiological and Therapeutic Action, Pharmacy, Uses in Medicine. Two Editions. Monograph, 70 pages.

*Kola Illustrated.

Third Edition, Revised. Monograph, 24 pages.

*Papoid.

Formula and Methods of Use. Monograph, 32 pages.

*Papoid Digestion.

By R. H. Chittenden, Ph. D. Reports from transactions of Connecticut Academy, Sheffield Scientific School. Monograph, 48 pages.

*The Digester.

Booklet, 8 pages.

*On the Treatment of Diphtheria and Dyspepsia with Papoid.

Being the resume of our present knowledge of the drug store compiled from the published writings of the most eminent English, Continental and United States authorities upon the subject. Pamphlet, 32 pages.

*Dermol.

Blisters and Substitutes for Ointments. Leaflet, 4 pages.

*Functional Dyspepsia, So-called.

R. C. M. Page, M. D. Booklet, 8 pages.

*Diphtheria.

By John A. Larrabee, M. D., Louisville, Ky. Booklet, 4 pages.

*Intestinal Indigestion.

Thomas Hunt Stucky, M. D., Ph. D. Booklet, 32 pages.

*Tattooing and Its Successful Removal.

A. H. Ohmann-Dumesnil, A. M., M. D. Booklet, 14 pages.

*Kolafra.

In the Treatment of Anæmic Conditions and Cardiac Affections and Alcoholism. Booklet, 8 pages.

Kingstone Catheters and Bougies.

THE Kingstone products are the outcome of two generations of skilled labor applied to the production of perfect urethral instruments. They have received the patronage and commendation of Mercier, Foucher, Dolbeau, Guillon, Sir Henry Thompson, and others eminent in genito-urinary surgery. They have been given the highest awards ever bestowed upon instruments of this class, including the Bronze Medal, Exposition Universal, Paris, 1867; Silver Medal, Exposition Lyons, 1872; Grand Medal for Progress, Exposition Vienna, 1873.

They have been adopted and highly endorsed by the hospitals of Paris, receiving a part of the Barber Prize from the Faculty of the Academy of Medicine. The Argenteuil Prize from the Academy of Medicine, of Paris, was also awarded for excellence of manufacture.

DR. J. W. S. GOULEY, Surgeon to Bellevue Hospital, author of "*Diseases of the Genito-Urinary Organs*," says of them:—

"The Catheters and Bougies manufactured at the Kingstone establishment are fully equal to the best instruments ever made in Paris."—*New York Medical Journal*, 1893.

The eyes of the Kingstone Catheters are all woven, specially strengthened and stayed, smoothly finished. The ends are firmly stayed.

The coatings are made of elastic, pliable gums, carefully selected and prepared; laid on uniformly with a durable, velvet-smooth finish.

From four to six months' time is given to the coating and curing processes.

The Kingstone Catheters are elastic, pliable, springy, yet firm from end to end.

The Kingstone Catheters will not collapse or become soft and sticky.

The Kingstone Catheters and Bougies resist the action of lubricating substances, antiseptic solutions, urinary and tissue fluids.

They are not impaired by sterilization.

An illustrated monograph, giving kinds, sizes and shapes, with suggestions for the care of Catheters and Bougies, will be sent upon application.

JOHNSON & JOHNSON,
New Brunswick, N. J., U. S. A.

